

ANNUAL REPORT 1964

WESTMINSTER

water pollution control plant

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SEP 13 1965
ONTARIO WATER
RESOURCES COMMISSION

DIVISION OF PLANT OPERATIONS

Ontario Water Resources Commission

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ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

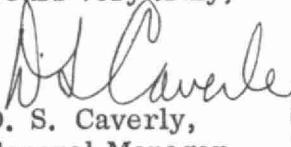
Members of the Westminster Local Advisory Committee,
Township of Westminster.

Gentlemen:

We are pleased to provide you with the 1964 Operating Report for
the Westminster Water Pollution Control Plant, OWRC Project No.
59-S-33.

By continuing the mutual cooperation which has existed in the past,
we can look forward to greater progress in the field of water
pollution control.

Yours very truly,


D. S. Caverly,
General Manager



General Manager,
Ontario Water Resources Commission.

Dear Sir:

It is with pleasure that I present to you the Annual Report of the operation of the Westminster Water Pollution Control Plant, OWRC Project No. 59-S-33.

This report presents design data, outlines operating problems encountered and summarizes in tables charts and graphs all significant flow and cost data.

Yours very truly,

B.C. Palmer

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

This report describes the operation of this project for the year 1964. It includes a detailed description of the project, summary of operation, graphs and charts showing quality and quantity information, and project cost data.

This information will be of value to the municipality in assessing the adequacy of the works in meeting existing requirements and in projecting its capability to meet future expected demands. The cost information will be of particular interest to those concerned with developing and maintaining revenue structures.

The preparation of this report has been a cooperative effort of several groups within the Division of Plant Operations. These include the Statistical Section, Brochures Officer and the Regional Supervisor. However, the primary responsibility for the content has been with the Regional Operations Engineer. He will be pleased to discuss all aspects of this report with the municipality.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

CONTENTS

WESTMINSTER
water pollution control plant

operated for

THE TOWNSHIP OF WESTMINSTER

by the

ONTARIO WATER RESOURCES COMMISSION

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DIVISION OF PLANT OPERATIONS

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Assistant Director: C. W. Perry
Regional Supervisor: A. Beattie
Operations Engineer: P. J. Osmond

801 Bay Street Toronto 5

'64 REVIEW

The average daily flow for the year was 143,300 gallons which was an increase of 132% over 1963. This flow represented 57% of the design capacity and therefore allowed one aeration tank to be used for aeration and the other to be used as an aerobic digester.

A raw sewage having an average strength of 135 ppm BOD and 250 ppm SS was treated. The resulting effluent had an average BOD of 7 ppm and SS of 29 ppm resulting in reductions of 95% and 88.5% respectively.

During the early part of 1964 an industrial waste was received at the plant which resulted in an impairment of the final effluent. The offending waste was discovered and eliminated; and the sand filter beds were put in operation with the result that the final effluent showed a marked improvement.

Chlorination was carried out from May 6 to October 5 and a chlorine residual of 0.5 ppm was maintained during this period.

Inspections were made of the structures and grounds. The plant has been in operation approximately 4 1/2 years. A major painting program, both indoors and outdoors, was initiated and will continue into 1965. Some minor repair work to structures was included in the program. The grounds were well maintained and an increase of the grassed area outside the plant fence was proposed for 1965.

A mechanical and electrical inspection was made of the project equipment by the head office Maintenance Section. The only major repair work which resulted was the replacement of the timing gears, seals and bearings on the No. 2 blower. A total of 116 hours was spent by the head office technical staff at the project during the year.

The total operating cost for the year was \$10,784.36 which is a 21% increase over the cost of \$8,502.58 in 1963. However, the cost per million gallons treated in 1964 was \$250.53 which is a decrease of 45% over the cost of \$376.00 in 1963.

GLOSSARY

BOD	biochemical oxygen demand (a measure of organic content)
cfm	cubic feet per minute
communition	shredding of solids into small fragments
DWF	dry weather flow
effluent	outflow
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpcd	gallons per capita per day
gpm	gallons per minute
grit	sand, dust, stones, cinders and other heavy inorganic material
influent	inflow
lin. ft.	lineal feet
mgd	million gallons per day
mlss	mixed liquor suspended solids
ppm	parts per million
ss	suspended solids
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)

HISTORY

1958 - 1964

INCEPTION

In 1958, the Township of Westminster and the Ontario Water Resources Commission initiated plans for the construction of a modern water pollution control plant.

The firm of S. G. Chipman, London, Ontario, Consulting Engineers, was engaged to prepare plans and specifications for the project.

APPROVAL

In June 1959, the Township signed an agreement with the Ontario Water Resources Commission to finance, construct and operate the plant.

CONSTRUCTION

Frid Construction Company Limited began construction in June 1959 and in May 1960 the Division of Plant Operations took over the operation.

TOTAL COST

\$204,954.00



D. C. SIMPSON
CHIEF OPERATOR

Project Staff

The Westminster Township plant is operated by a single operator. It is possible for one operator, with supervision and technical assistance from the OWRC head office staff to maintain and efficiently operate a project of this size. Casual help is also used at the plant when Mr. Simpson requires assistance or when he requires time off for such reasons as holidays or attendance at training courses.

Supervision at the plant is based on a total of 40 hours per week, 36 hours occurring during the period from Monday to Friday inclusive and for two hours on both Saturday and Sunday.

During 1964, Mr. Simpson attended intermediate and senior courses for sewage plant operators and obtained good standing in the examinations for both courses. On completion of the senior course he received a Certificate of Qualification as a sewage works operator.

Description of Project

INFLUENT SEWER

The sewage enters the plant through a 21 inch diameter concrete sewer and passes through a barminitor which shreds the larger solids. A bypass channel equipped with a coarse bar screen is provided when it is necessary to service the barminitor.

The screened and shredded sewage flows to a wet well from which it is pumped by two pumps to the aeration section influent channel.

AERATION

Sewage enters the aeration section - consisting of two rectangular concrete tanks - where it is mixed with activated sludge which is returned from the final clarifiers. The mixture or "mixed liquor" as it is called, is retained in the aeration section for approximately 24 hours during which time it is mixed and aerated by three blowers. It is during this period that the biological activity takes place; dissolved material is absorbed, and suspended and colloidal material is adsorbed by the bacteria.

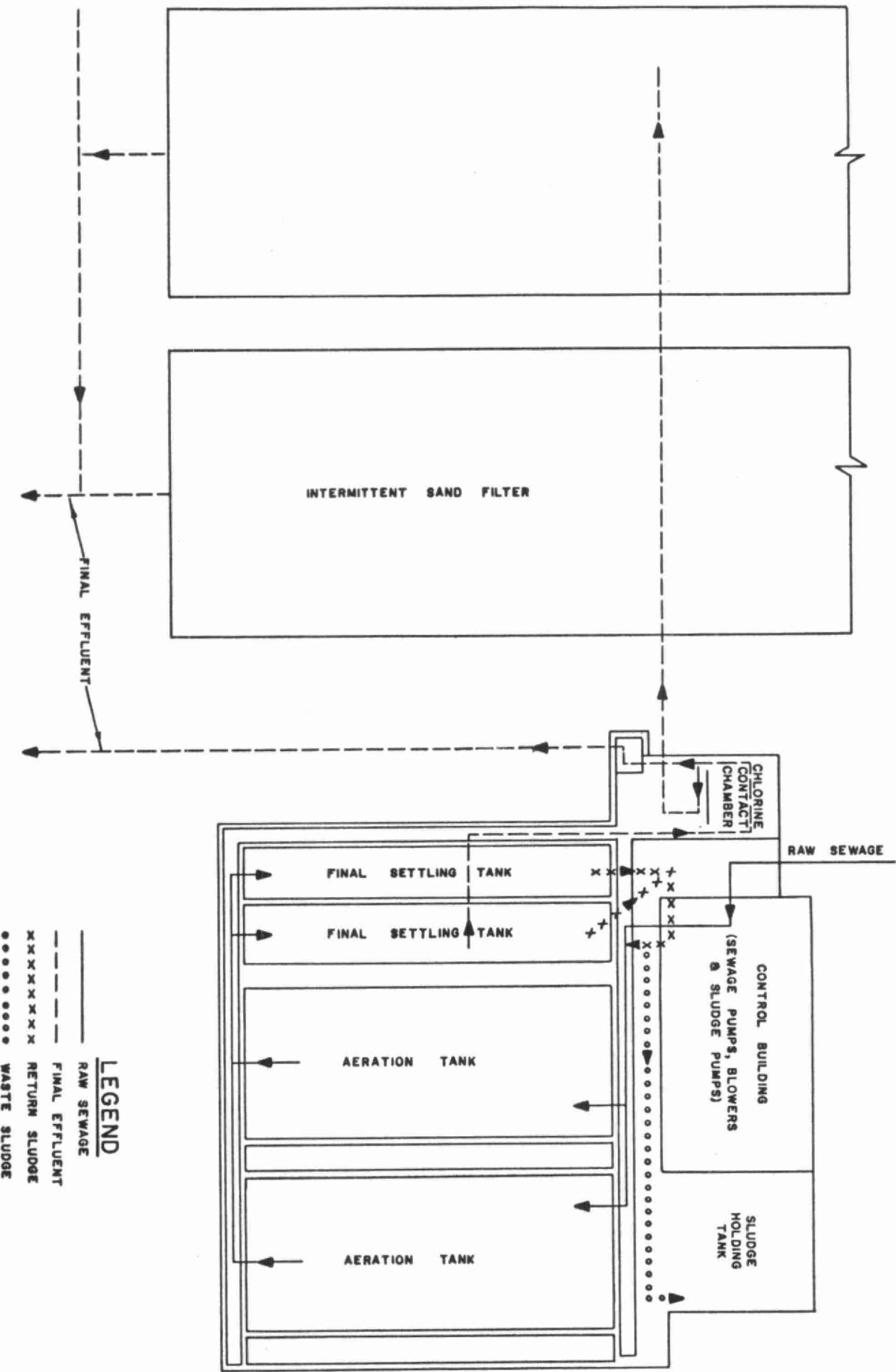
FINAL SEDIMENTATION

The aerated mixed liquor from the aeration section is retained in two rectangular final tanks for four hours at design flow. This allows the activated sludge to separate from the treated sewage and settle to the bottom of the tank where it is collected by scraping mechanisms to a hopper and returned to either the aeration section or the sludge holding tank. (Excess activated sludge, not required in the treatment process is wasted to the sludge holding tank from which it is hauled from the plant by truck). The treated sewage flows over the weirs of the final tanks to the chlorine contact chamber where it is disinfected by the addition of chlorine. At design flow the treated sewage is retained in the chamber for twenty minutes after which time it is either discharged directly to the creek or to sand filters, depending upon the season.

INTERMITTENT SAND FILTERS

When freezing is not a problem; the final effluent or treated sewage is discharged to four rectangular sand filter beds by means of a pump. The effluent passes through these filters and is then discharged to Dingman Creek.

**FLOW
DIAGRAM**



PROJECT COSTS

<u>LONG TERM DEBT:</u> (Total Capital Cost)	\$204, 954. 00
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The total cost to the municipality during 1964 was as follows:

Net Operating	\$ 10, 784. 36
Debt Retirement	-
Reserve	1, 796. 00
Interest Charged	11, 530. 75
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TOTAL	\$ 24, 111. 11
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RESERVE ACCOUNT

Balance at January 1, 1964	\$ 7, 038. 31
Deposited by municipality	1, 796. 00
Interest Earned	426. 04
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	\$ 9, 260. 35

<u>Less</u> Expenditures	-
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Balance at December 1, 1964	\$ 9, 260. 35
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<u>DEBT OUTSTANDING</u>	\$204, 954. 00
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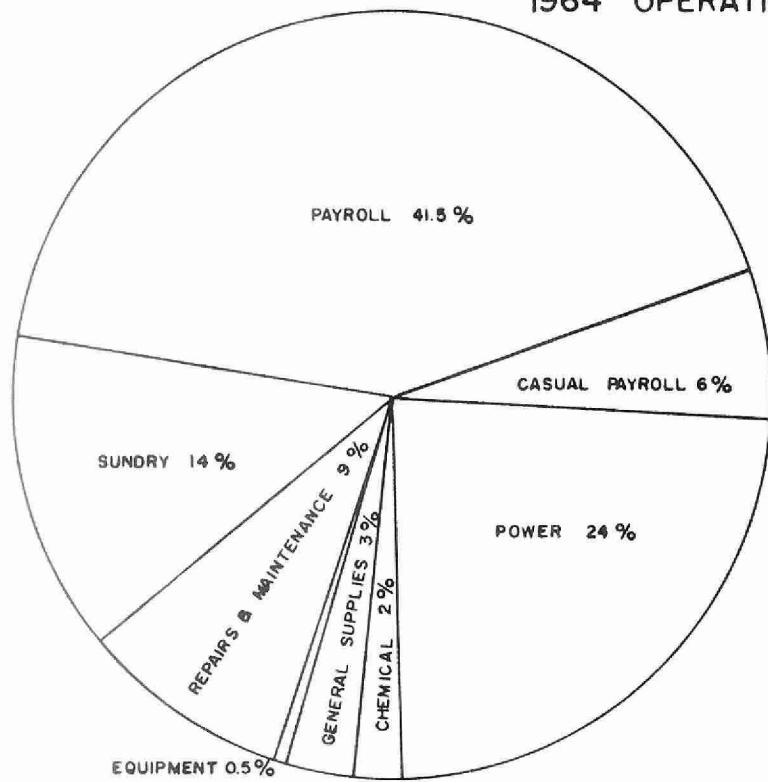
MONTHLY COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	# SUNDY
JAN	579.40	316.50			213.77		49.13			
FEB	613.78	316.50			217.50		33.67		1.31	44.80
MARCH	609.74	351.69			204.26		4.75		10.11	38.93
APRIL	604.75	328.64			204.14		40.43	9.24		22.30
MAY	1570.08	492.96	86.94		202.65	407.23		40.75	289.15	50.40
JUNE	872.18	443.82			164.67		38.30		127.44	97.95
JULY	888.45	347.60			181.65		3.80		307.75	47.65
AUG	583.75	340.82			189.12		53.81			
SEPT	863.25	340.82	99.32		191.92	120.99	23.98		30.00	56.22
OCT	1252.71	340.82	149.04		190.90		10.55		123.30	438.10
NOV	1054.20	340.82	205.74		210.46		26.74			270.44
DEC	1292.07	519.27	97.20		431.74	(315.00)	31.26		92.68	439.92
TOTAL	10784.36	4480.26	633.24		2602.78	213.22	316.42	49.99	981.74	1506.71

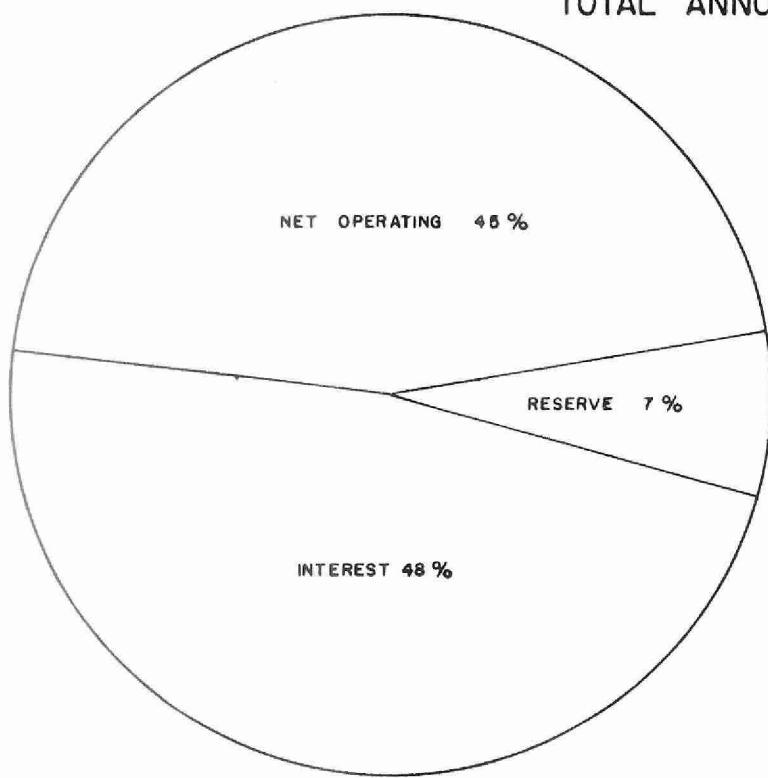
* SUNDY INCLUDES SLUDGE HAULING COSTS WHICH WERE \$471.75

BRACKETS INDICATE CREDIT

1964 OPERATING COSTS



TOTAL ANNUAL COST



Design– Data

GENERAL

Type of Plant - Extended aeration

Design Population - 5,000 persons

Design Plant Flow - 250,000 GPD

Per Capita Flow - 50 gallons

INFLUENT SEWER

21 in. concrete

SCREENING

Bypass channel equipped with a bar screen with 1 in. spaces.

COMMINUTION

1 - Model B-12 in. Barminutor as manufactured by Chicago Pump Company.

RAW SEWAGE PUMPS

Two 4 in. vertical centrifugal pumps by Chicago Pump Company each having a capacity of 100 GPM at 23 ft. TDH. Both pumps are driven by 2 HP Lincoln motors and #1 pump is also equipped with a standby gasoline engine by Wisconsin; Model TDH.

AERATION TANKS

Two rectangular concrete tanks each 54 ft. by 27 ft. by 14 ft. total volume - 40,368 cu. ft. or 252,000 gallons. Detention time at design flow assuming no return sludge - 24.2 hours.

AIR BLOWERS

Three Sutorbilt blowers model 8HV supplying 337 cfm at 7 psi. Each blower is driven by a 15 HP Leland-Newman Motor.

RETURN SLUDGE PUMP

One 4 in. vertical centrifugal pump by

Chicago Pump Company having a capacity of 200 GPM at 10.5 TDH. This pump is driven by a 2 HP U.S. Vari-drive motor.

FINAL SETTLING TANKS

Two rectangular concrete tanks each 54 ft. by 8 ft. by 9 ft.

Total volume - 7,760 cu. ft. - 48,500 gallons.

Detention period at design flow - 4.65 hours.

Total surface settling rate - 580 gallons per sq. ft. per day.

Each tank is equipped with sludge collector mechanisms by Link-Belt which are driven by 1/2 HP Leland Electric Motors.

CHLORINE CONTACT CHAMBER

One rectangular concrete tank 10 ft. by 7 ft. by 9 ft.

Total Volume - 630 cu. ft. - 3930 gallons
Contact period at design flow - 22.7 minutes.

CHLORINATOR

One Wallace and Tiernan Model A-741 capable of metering 100 lbs. of chlorine per 24 hours.

EFFLUENT WELL PUMP

One 900 GPM at 9.6 ft. TDH Chicago Pump Company driven by a 5 HP Lincoln motor.

INTERMITTENT SAND FILTERS

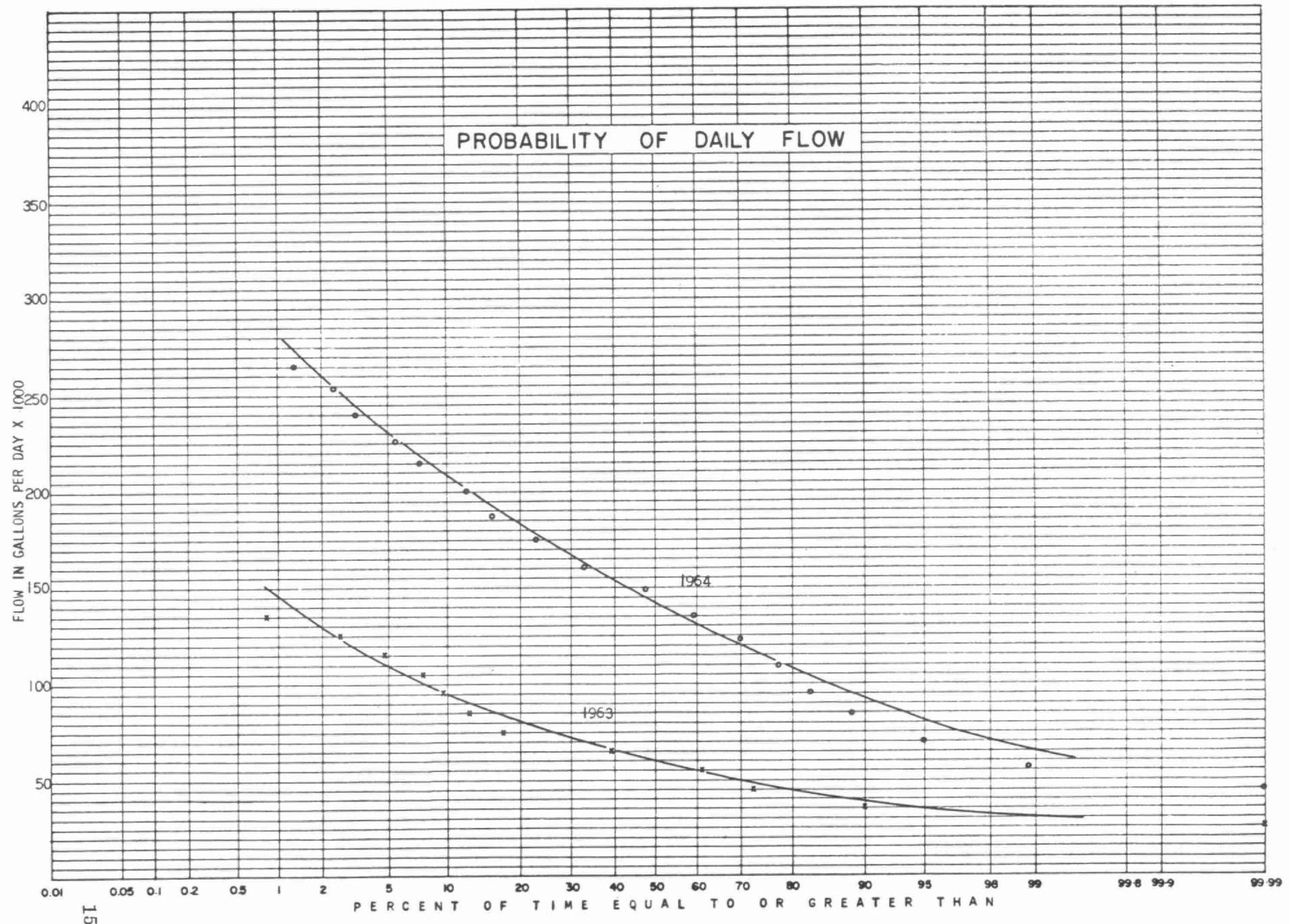
Four rectangular units having a total area of 26,900 sq. ft. or 0.62 acres. Capacity of the filters is 450,000 gallons per acre per day. Minimum depth of sand is 30 inches.

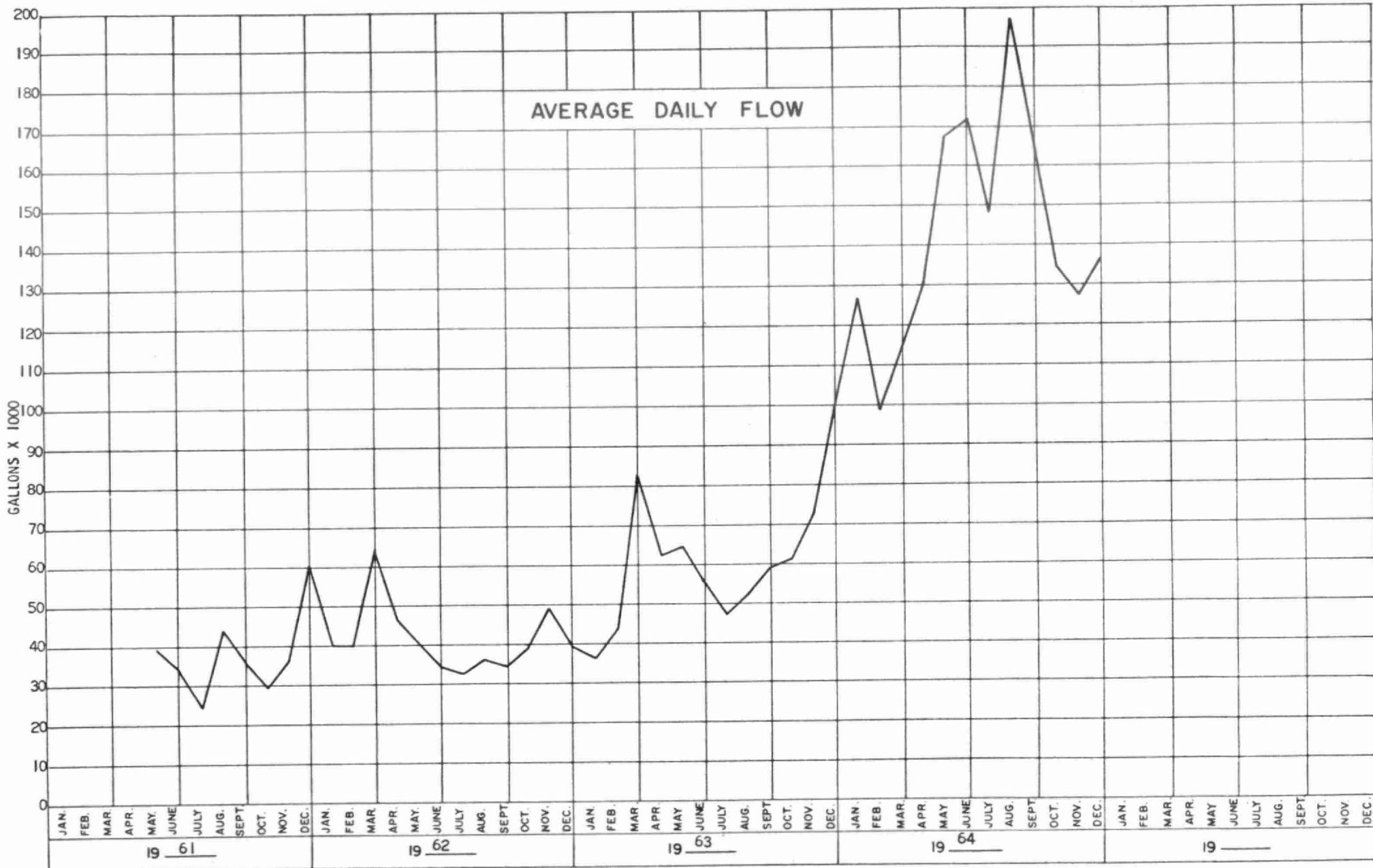
SLUDGE HOLDING TANK

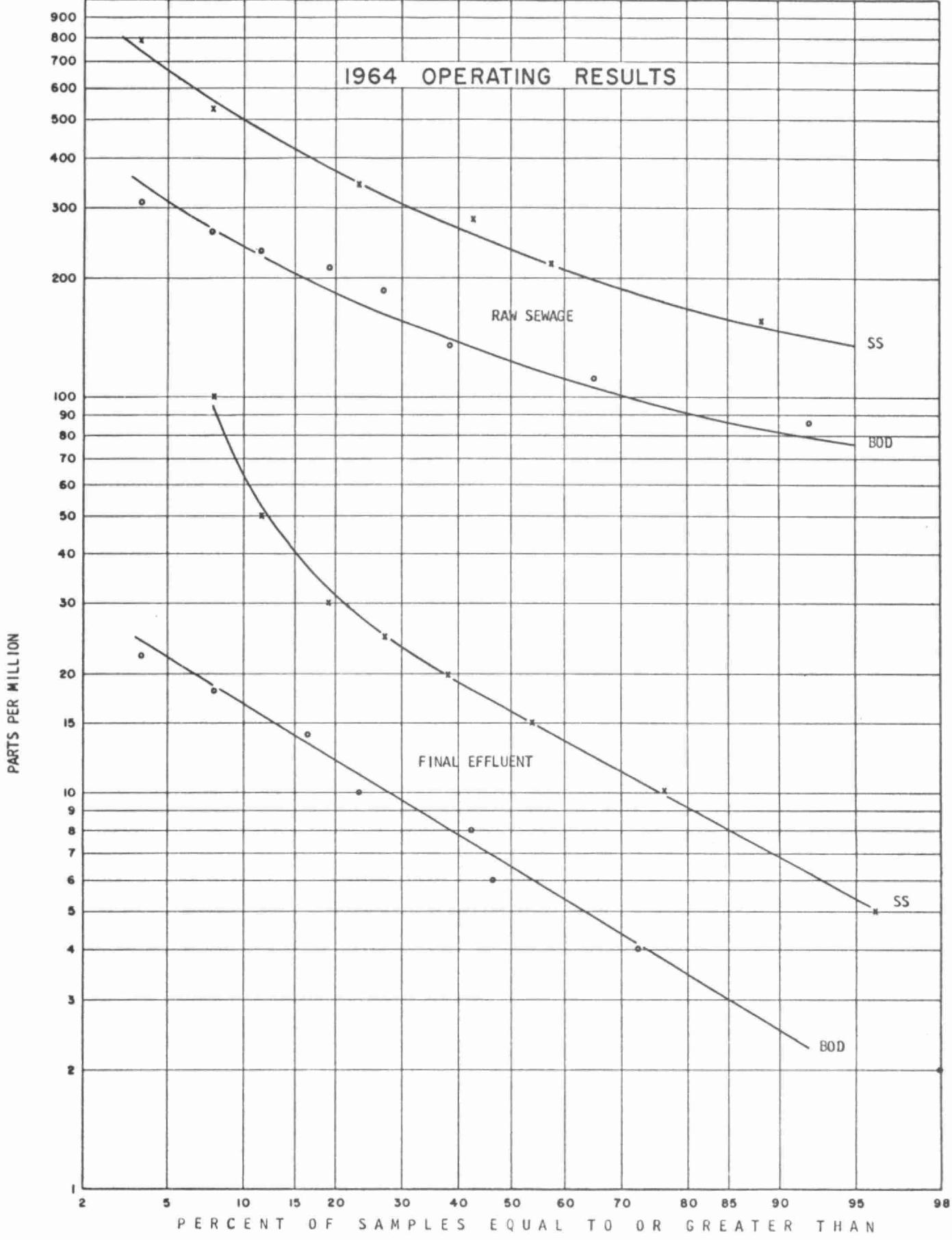
Total volume of 4,460 cu. ft.

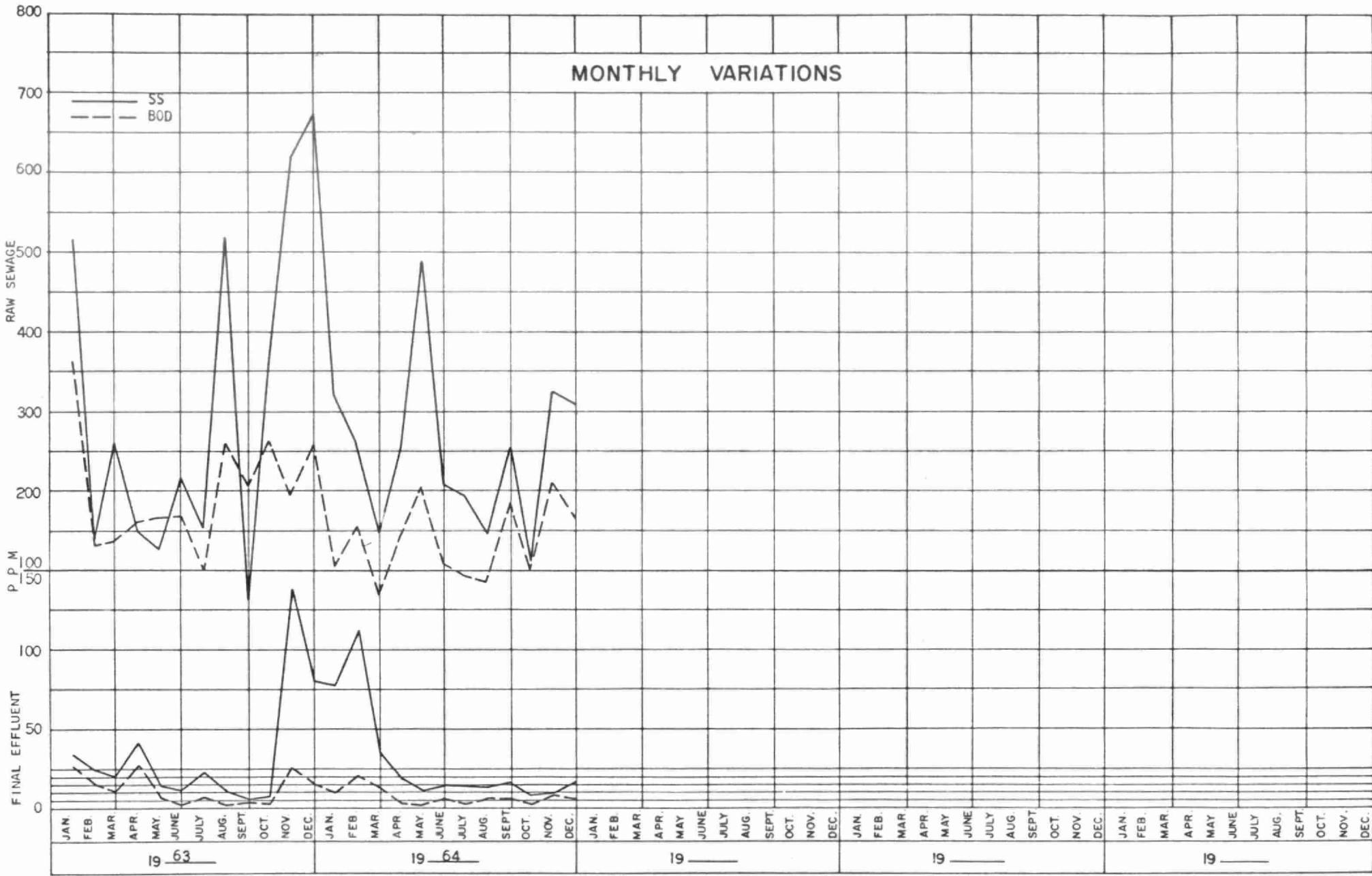
Process Data

A total of 52,469 million gallons of sewage was treated at the plant in 1964 as compared to 22,613 million gallons in 1963. This is an increase of 132% and can be attributed to the connection of the Wellington Road sewer. The average daily flow for the year was 143,000 gallons and represents 57% of the design flow. The maximum average daily flow for a month occurred in August when the flow was 198,000 gallons per day which represents 79% of the design capacity.









GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	
JAN.	103	10.0	90.0	1.8	316	78	75.5	4.7	
FEB.	154	20.0	87.0	1.9	255	111	56.5	2.0	
MAR.	69	14.0	79.5	1.0	146	36	75.5	1.9	
APR.	142	3.4	97.5	2.7	253	19	92.5	4.5	
MAY	202	2.5	98.5	5.2	491	12	97.5	12.5	
JUNE	108	6.2	94.0	2.6	209	14	93.0	5.0	
JULY	92	3.2	96.5	2.0	191	14	92.5	4.0	
AUG.	86	6.4	92.5	2.4	148	14	90.5	4.1	
SEPT.	182	6.2	96.5	4.4	251	17	93.0	5.8	
OCT.	101	3.0	97.0	2.0	106	9	91.5	2.0	
NOV.	210	8.0	96.0	3.8	325	9	97.0	6.0	
DEC.	168	6.0	96.5	3.4	311	17	94.5	6.2	
TOTAL				33.2				58.0	
AVG.	135	7.0	95.0	2.8	250	29	88.5	4.8	

COMMENTS

The average strength of the raw sewage for the year was 135 ppm BOD and 250 ppm SS. The final effluent had an average BOD of 7 ppm and an average SS of 29 ppm which resulted in an average reduction of 95% and 88.5% respectively. The final effluent BOD met the Ontario Water Resources Commission standard of 15 ppm 87% of the time and the SS standard of 15 ppm 47% of the time. The above results are based on samples taken every two weeks.

During the early part of 1964 an industrial waste was received at the plant and proved to be difficult to treat. This resulted in an impairment in the quality of the final effluent. The offending waste was found and eliminated. At approximately the same time on April 7 the sand filter beds were put in operation and the quality of the final effluent showed a marked improvement. The sand filter beds were taken out of operation on December 6.

AERATION SECTION

MONTH	PRIM. EFFL BOD, PPM. *	MLSS. PPM.	LBS. BOD. PER 100 LBS. M. L. S. S.	CUBIC FEET AIR PER LB. BOD. REMOVED
JANUARY	103	4997	2	4,200
FEBRUARY	154	5160	2	3,700
MARCH	69	3640	2	7,500
APRIL	142	3640	4	2,700
MAY	202	3983	6	1,500
JUNE	108	4500	3	3,700
JULY	92	4580	3	5,000
AUGUST	86	4667	3	4,200
SEPTEMBER	182	4940	5	2,300
OCTOBER	101	5260	2	4,600
NOVEMBER	210	5109	4	2,000
DECEMBER	168	5013	4	2,500
TOTAL				
AVERAGE	135	4624	3	3,700

* Raw BOD - no primary

COMMENTS

One tank of the aeration section was used for aeration and the other tank was used as an aerobic digester in 1964, since the flow to the plant was approximately one half the design capacity. In August the flows increased and it seemed that the second aeration tank would be required for aeration and so 675 cu. yds. of sludge was wasted from the aerobic digester to the holding tank and hauled away. However, the flows decreased and the one tank continued in use as an aeration tank during the balance of the year.

The average loading of the aeration tank was 3 pound BOD per 100 pounds mixed liquor SS with an average of 4624 ppm SS in the mixed liquor. An average of 3700 cu. ft. of air was supplied per pound of BOD and includes air supplied to the aerobic digestor. Approximately 30% of the air supply went to the aerobic digestor in the period from January to November.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	3.931		
FEBRUARY	2.848		
MARCH	3.525		
APRIL	3.888		
MAY	5.205	* 189	5.11
JUNE	5.168	270	5.22
JULY	4.582	279	6.09
AUGUST	6.136	292	4.76
SEPTEMBER	5.008	262	5.23
OCTOBER	4.167	** 38	5.12
NOVEMBER	3.807		
DECEMBER	4.204		
TOTAL	52.469	1330	
AVERAGE	4.372	222	5.26

* 22 days chlorination

** 5 days chlorination

COMMENTS

The final effluent was disinfected with chlorine from May 6 to October 5. A total of 1330 pounds of chlorine was used at an average dosage of 5.26 ppm. A residual of at least 0.5 ppm was maintained during this period.

LABORATORY LIBRARY



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CONCLUSIONS

The plant operated at 57% of design capacity during the year and has more than sufficient capacity for the present flows. The plant efficiently treated the sewage when it was not hampered by adverse industrial wastes. The use of the sand beds improved the quality of the effluent. The total cost of operation was greater than in 1963 but the cost per million gallons treated was less than in 1963. The plant was well maintained and operated during the year.

